



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Michael R. Slater, *et al.*  
Serial No.: 09/641,319  
Filed: 08/18/00  
Entitled: **Mutant TNE Polymerases**

Group No.:  
Examiner:

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Dated: <u>11/12/2003</u>	By: <u>Susan M. McClintock</u> Susan M. McClintock

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I hereby state that the enclosed substitute Sequence Listing is being submitted in paper copy and on a computer-readable diskette, and that the content of the paper and computer-readable copies are the same.

Dated: 11/12/03

By: [Signature]  
David A. Casimir  
Registration No. 42,395

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608/218-6900



# SEQUENCE LISTING

<110> Slater, Michael R.  
Huang, Fen R.  
Hartnett, James R.

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Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala	
530 535 540	
atg ata gat ata gac gag gag ctg aga aaa aga aac atg aaa tcc aga	1680
Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg	
545 550 555 560	
atg atc att cag gtt cat gac gaa ctg gtc ttc gag gtt ccc gat gag	1728
Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu	
565 570 575	
gaa aaa gaa gaa cta gtt gat ctg gtg aag aac aaa atg aca aat gtg	1776
Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val	
580 585 590	
gtg aaa ctc tct gtg cct ctt gag gtt gac ata agc atc gga aaa agc	1824
Val Lys Leu Ser Val Pro Leu Glu Val Asp Ile Ser Ile Gly Lys Ser	
595 600 605	
tgg tct tga	1833
Trp Ser	
610	

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 <211> 610  
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<400> 8

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1 5 10 15

Ile Val Lys Asp His Lys Thr Phe Glu Asp Leu Ile Glu Lys Leu Lys
20 25 30

Glu Val Pro Ser Phe Ala Leu Asp Leu Glu Thr Ser Ser Leu Asp Pro
35 40 45

Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr
50 55 60

Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu  
 65 70 75 80  
 Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser  
 85 90 95  
 Lys Ile Val Gly Gln Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val  
 100 105 110  
 Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala  
 115 120 125  
 Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser  
 130 135 140  
 Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser  
 145 150 155 160  
 Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp  
 165 170 175  
 Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu  
 180 185 190  
 Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val  
 195 200 205  
 Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu  
 210 215 220  
 Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu  
 225 230 235 240  
 Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile  
 245 250 255  
 Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile  
 260 265 270  
 Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr  
 275 280 285  
 Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu  
 290 295 300  
 His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu  
 305 310 315 320

Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr  
325 330 335

Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg  
340 345 350

Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu  
355 360 365

Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp  
370 375 380

Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala  
385 390 395 400

His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile  
405 410 415

Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu  
420 425 430

Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser  
435 440 445

Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile  
450 455 460

Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr  
465 470 475 480

Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu  
485 490 495

Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln  
500 505 510

Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala  
515 520 525

Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala  
530 535 540

Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg  
545 550 555 560

Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu  
565 570 575

Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val  
580 585 590

Val Lys Leu Ser Val Pro Leu Glu Val Asp Ile Ser Ile Gly Lys Ser  
595 600 605

Trp Ser  
610

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<212> DNA  
<213> Artificial Sequence

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31

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<212> DNA  
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<220>  
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Met Val Pro Ser Phe Ala Leu Asp Leu Glu Thr Ser Ser Leu Asp Pro  
1 5 10 15

48

ttc aac tgt gag ata gtc ggc atc tcc gtg tcg ttc aaa ccg aaa aca  
Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr  
20 25 30

96

gct tat tac att cca ctt cat cac aga aac gcc cag aat ctt gat gaa  
Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu  
35 40 45

144

aca ctg gtg ctg tcg aag ttg aaa gag atc ctc gaa gac ccg tct tcg  
Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser  
50 55 60

192

aag att gtg ggt cag aac ctg aag tac gac tac aag gtt ctt atg gta  
Lys Ile Val Gly Gln Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val  
65 70 75 80

240



aag ggt ata tcg cca gtt tat ccg cat ttt gac acg atg ata gct gca Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala 85 90 95	288
tat ttg ctg gag cca aac gag aaa aaa ttc aat ctc gaa gat ctg tct Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser 100 105 110	336
ttg aaa ttt ctc gga tac aaa atg acg tct tat cag gaa ctg atg tcg Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser 115 120 125	384
ttt tcc tca cca ctt ttt ggt ttc agc ttt gcg gat gtt ccg gta gac Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp 130 135 140	432
aag gct gcg aac tac tcc tgc gag gat gca gac atc act tat agg ctc Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu 145 150 155 160	480
tac aag ata ctc agc atg aag ctc cat gaa gcg gaa ctt gag aac gtc Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val 165 170 175	528
ttc tac agg ata gag atg ccg ctt gtg aac gtt ctt gca cgc atg gaa Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu 180 185 190	576
ttg aac ggg gtg tat gtg gac aca gaa ttc ctg aaa aag ctc tcg gag Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu 195 200 205	624
gag tac ggc aaa aag ctc gag gaa ctg gcc gaa aaa atc tac cag ata Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile 210 215 220	672
gca gga gag ccc ttc aac atc aat tct cca aaa cag gtt tca aag atc Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile 225 230 235 240	720
ctt ttt gag aag ctg gga ata aaa ccc cgt gga aaa acg aca aaa aca Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr 245 250 255	768
gga gcg tac tct acc agg ata gag gtg ttg gaa gag ata gcg aat gag Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu 260 265 270	816
cac gag ata gta ccc ctc att ctc gag tac aga aag atc cag aaa ctg His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu 275 280 285	864
aaa tcg acc tac ata gac acc ctt ccg aaa ctt gtg aac ccg aaa acc Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr 290 295 300	912
gga aga att cat gca tct ttc cac cag acg ggt acc gcc act ggc agg Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg 305 310 315 320	960

ttg agt agc agt gat cca aat ctt cag aat ctt ccg aca aag agc gaa	1008
Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu	
325 330 335	
gag gga aaa gaa att aga aaa gcg att gtg ccc cag gat cca gac tgg	1056
Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp	
340 345 350	
tgg atc gtc agt gcg gat tat tcc caa ata gaa ctc aga atc ctc gct	1104
Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala	
355 360 365	
cat ctc agt ggt gat gag aac ctt gtg aag gcc ttc gag gag ggc atc	1152
His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile	
370 375 380	
gat gtg cac acc ttg act gcc tcc agg atc tac aac gta aag cca gaa	1200
Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu	
385 390 395 400	
gaa gtg aac gaa gaa atg cga cgg gtt gga aag atg gtg aac ttc tct	1248
Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser	
405 410 415	
ata ata tac ggt gtc aca ccg tac ggt ctt tct gtg aga ctt gga ata	1296
Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile	
420 425 430	
ccg gtt aaa gaa gca gaa aag atg att atc agc tat ttc aca ctg tat	1344
Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr	
435 440 445	
cca aag gtg cga agc tac atc cag cag gtt gtt gca gag gca aaa gag	1392
Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu	
450 455 460	
aag ggc tac gtc agg act ctc ttt gga aga aaa aga gat att ccc cag	1440
Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln	
465 470 475 480	
ctc atg gca agg gac aag aac acc cag tcc gaa ggc gaa aga atc gca	1488
Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala	
485 490 495	
ata aac acc ccc att cag gga acg gcg gca gat ata ata aaa ttg gct	1536
Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala	
500 505 510	
atg ata gat ata gac gag gag ctg aga aaa aga aac atg aaa tcc aga	1584
Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg	
515 520 525	
atg atc att cag gtt cat gac gaa ctg gtc ttc gag gtt ccc gat gag	1632
Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu	
530 535 540	
gaa aaa gaa gaa cta gtt gat ctg gtg aag aac aaa atg aca aat gtg	1680
Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val	
545 550 555 560	

gtg aaa ctc tct gtg cct ctt gag gtt gac ata agc atc gga aaa agc 1728  
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565 570 575

tgg tct tga 1737  
Trp Ser

<210> 11  
<211> 578  
<212> PRT  
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<400> 11

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Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr  
20 25 30

Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu  
35 40 45

Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser  
50 55 60

Lys Ile Val Gly Gln Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val  
65 70 75 80

Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala  
85 90 95

Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser  
100 105 110

Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser  
115 120 125

Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp  
130 135 140

Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu  
145 150 155 160

Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val  
165 170 175

Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu  
180 185 190

Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu  
195 200 205

Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile  
210 215 220

Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile  
225 230 235 240

Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr  
245 250 255

Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu  
260 265 270

His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu  
275 280 285

Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr  
290 295 300

Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg  
305 310 315 320

Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu  
325 330 335

Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp  
340 345 350

Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala  
355 360 365

His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile  
370 375 380

Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu  
385 390 395 400

Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser  
405 410 415

Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile  
420 425 430

Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr  
 435 440 445

Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu  
 450 455 460

Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln  
 465 470 475 480

Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala  
 485 490 495

Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala  
 500 505 510

Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg  
 515 520 525

Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu  
 530 535 540

Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val  
 545 550 555 560

Val Lys Leu Ser Val Pro Leu Glu Val Asp Ile Ser Ile Gly Lys Ser  
 565 570 575

Trp Ser

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<220>  
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<400> 12  
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20

<210> 13  
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 <212> DNA  
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 <220>  
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 <400> 13  
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<210> 14  
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 <400> 14  
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<210> 15  
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 Met Lys Glu Leu Gln Leu Tyr Glu Glu Ala Glu Pro Thr Gly Tyr Glu  
 1 5 10 15  
 atc gtg aag gat cat aag acc ttc gaa gat ctc atc gaa aag ctg aag 96  
 Ile Val Lys Asp His Lys Thr Phe Glu Asp Leu Ile Glu Lys Leu Lys  
 20 25 30  
 gag gtt cca tct ttt gcc ctg gaa ctt gaa acg tcc tcc ctt gac ccg 144  
 Glu Val Pro Ser Phe Ala Leu Glu Leu Glu Thr Ser Ser Leu Asp Pro  
 35 40 45  
 ttc aac tgt gag ata gtc ggc atc tcc gtg tcg ttc aaa ccg aaa aca 192  
 Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr  
 50 55 60  
 gct tat tac att cca ctt cat cac aga aac gcc cag aat ctt gat gaa 240  
 Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu  
 65 70 75 80  
 aca ctg gtg ctg tcg aag ttg aaa gag atc ctc gaa gac ccg tct tcg 288  
 Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser  
 85 90 95

aag att gtg ggt cag aac ctg aag tac gac tac aag gtt ctt atg gta Lys Ile Val Gly Gln Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val 100 105 110	336
aag ggt ata tcg cca gtt tat ccg cat ttt gac acg atg ata gct gca Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala 115 120 125	384
tat ttg ctg gag cca aac gag aaa aaa ttc aat ctc gaa gat ctg tct Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser 130 135 140	432
ttg aaa ttt ctc gga tac aaa atg acg tct tat cag gaa ctg atg tcg Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser 145 150 155 160	480
ttt tcc tca cca ctt ttt ggt ttc agc ttt gcg gat gtt ccg gta gac Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp 165 170 175	528
aag gct gcg aac tac tcc tgc gag gat gca gac atc act tat agg ctc Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu 180 185 190	576
tac aag ata ctc agc atg aag ctc cat gaa gcg gaa ctt gag aac gtc Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val 195 200 205	624
ttc tac agg ata gag atg ccg ctt gtg aac gtt ctt gca cgc atg gaa Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu 210 215 220	672
ttg aac ggg gtg tat gtg gac aca gaa ttc ctg aaa aag ctc tcg gag Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu 225 230 235 240	720
gag tac ggc aaa aag ctc gag gaa ctg gcc gaa aaa atc tac cag ata Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile 245 250 255	768
gca gga gag ccc ttc aac atc aat tct cca aaa cag gtt tca aag atc Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile 260 265 270	816
ctt ttt gag aag ctg gga ata aaa ccc cgt gga aaa acg aca aaa aca Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr 275 280 285	864
gga gcg tac tct acc agg ata gag gtg ttg gaa gag ata gcg aat gag Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu 290 295 300	912
cac gag ata gta ccc ctc att ctc gag tac aga aag atc cag aaa ctg His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu 305 310 315 320	960
aaa tcg acc tac ata gac acc ctt ccg aaa ctt gtg aac ccg aaa acc Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr 325 330 335	1008

gga aga att cat gca tct ttc cac cag acg ggt acc gcc act ggc agg Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg 340 345 350	1056
ttg agt agc agt gat cca aat ctt cag aat ctt ccg aca aag agc gaa Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu 355 360 365	1104
gag gga aaa gaa att aga aaa gcg att gtg ccc cag gat cca gac tgg Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp 370 375 380	1152
tgg atc gtc agt gcg gat tat tcc caa ata gaa ctc aga atc ctc gct Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala 385 390 395 400	1200
cat ctc agt ggt gat gag aac ctt gtg aag gcc ttc gag gag ggc atc His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile 405 410 415	1248
gat gtg cac acc ttg act gcc tcc agg atc tac aac gta aag cca gaa Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu 420 425 430	1296
gaa gtg aac gaa gaa atg cga cgg gtt gga aag atg gtg aac ttc tct Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser 435 440 445	1344
ata ata tac ggt gtc aca ccg tac ggt ctt tct gtg aga ctt gga ata Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile 450 455 460	1392
ccg gtt aaa gaa gca gaa aag atg att atc agc tat ttc aca ctg tat Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr 465 470 475 480	1440
cca aag gtg cga agc tac atc cag cag gtt gtt gca gag gca aaa gag Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu 485 490 495	1488
aag ggc tac gtc agg act ctc ttt gga aga aaa aga gat att ccc cag Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln 500 505 510	1536
ctc atg gca agg gac aag aac acc cag tcc gaa ggc gaa aga atc gca Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala 515 520 525	1584
ata aac acc ccc att cag gga acg gcg gca gat ata ata aaa ttg gct Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala 530 535 540	1632
atg ata gat ata gac gag gag ctg aga aaa aga aac atg aaa tcc aga Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg 545 550 555 560	1680
atg atc att cag gtt cat gac gaa ctg gtc ttc gag gtt ccc gat gag Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu 565 570 575	1728



gaa aaa gaa gaa cta gtt gat ctg gtg aag aac aaa atg aca aat gtg 1776  
 Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val  
                   580                                  585                                  590

gtg aaa ctc tct gtg cct ctt gag gtt gac ata agc atc gga aaa agc 1824  
 Val Lys Leu Ser Val Pro Leu Glu Val Asp Ile Ser Ile Gly Lys Ser  
                   595                                  600                                  605

tgg tct tga 1833  
 Trp Ser  
           610

<210> 16  
 <211> 610  
 <212> PRT  
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<220>  
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<400> 16

Met Lys Glu Leu Gln Leu Tyr Glu Glu Ala Glu Pro Thr Gly Tyr Glu  
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Ile Val Lys Asp His Lys Thr Phe Glu Asp Leu Ile Glu Lys Leu Lys  
                   20                                  25                                  30

Glu Val Pro Ser Phe Ala Leu Glu Leu Glu Thr Ser Ser Leu Asp Pro  
                   35                                  40                                  45

Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr  
                   50                                  55                                  60

Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu  
   65                                  70                                  75                                  80

Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser  
                   85                                  90                                  95

Lys Ile Val Gly Gln Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val  
                   100                                  105                                  110

Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala  
                   115                                  120                                  125

Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser  
   130                                  135                                  140

Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser  
   145                                  150                                  155                                  160

Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp  
 165 170 175  
 Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu  
 180 185 190  
 Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val  
 195 200 205  
 Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu  
 210 215 220  
 Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu  
 225 230 235 240  
 Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile  
 245 250 255  
 Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile  
 260 265 270  
 Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr  
 275 280 285  
 Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu  
 290 295 300  
 His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu  
 305 310 315 320  
 Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr  
 325 330 335  
 Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg  
 340 345 350  
 Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu  
 355 360 365  
 Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp  
 370 375 380  
 Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala  
 385 390 395 400  
 His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile  
 405 410 415

Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu  
420 425 430

Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser  
435 440 445

Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile  
450 455 460

Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr  
465 470 475 480

Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu  
485 490 495

Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln  
500 505 510

Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala  
515 520 525

Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala  
530 535 540

Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg  
545 550 555 560

Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu  
565 570 575

Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val  
580 585 590

Val Lys Leu Ser Val Pro Leu Glu Val Asp Ile Ser Ile Gly Lys Ser  
595 600 605

Trp Ser  
610

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atc gtg aag gat cat aag acc ttc gaa gat ctc atc gaa aag ctg aag	96	
Ile Val Lys Asp His Lys Thr Phe Glu Asp Leu Ile Glu Lys Leu Lys		
20 25 30		
gag gtt cca tct ttt gcc ctg gac ctt gac acg tcc tcc ctt gac ccg	144	
Glu Val Pro Ser Phe Ala Leu Asp Leu Asp Thr Ser Ser Leu Asp Pro		
35 40 45		
ttc aac tgt gag ata gtc ggc atc tcc gtg tcg ttc aaa ccg aaa aca	192	
Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr		
50 55 60		
gct tat tac att cca ctt cat cac aga aac gcc cag aat ctt gat gaa	240	
Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu		
65 70 75 80		
aca ctg gtg ctg tcg aag ttg aaa gag atc ctc gaa gac ccg tct tcg	288	
Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser		
85 90 95		
aag att gtg ggt cag aac ctg aag tac gac tac aag gtt ctt atg gta	336	
Lys Ile Val Gly Gln Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val		
100 105 110		
aag ggt ata tcg cca gtt tat ccg cat ttt gac acg atg ata gct gca	384	
Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala		
115 120 125		
tat ttg ctg gag cca aac gag aaa aaa ttc aat ctc gaa gat ctg tct	432	
Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser		
130 135 140		

ttg aaa ttt ctc gga tac aaa atg acg tct tat cag gaa ctg atg tcg	480
Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser	
145 150 155 160	
ttt tcc tca cca ctt ttt ggt ttc agc ttt gcg gat gtt ccg gta gac	528
Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp	
165 170 175	
aag gct gcg aac tac tcc tgc gag gat gca gac atc act tat agg ctc	576
Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu	
180 185 190	
tac aag ata ctc agc atg aag ctc cat gaa gcg gaa ctt gag aac gtc	624
Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val	
195 200 205	
ttc tac agg ata gag atg ccg ctt gtg aac gtt ctt gca cgc atg gaa	672
Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu	
210 215 220	
ttg aac ggg gtg tat gtg gac aca gaa ttc ctg aaa aag ctc tcg gag	720
Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu	
225 230 235 240	
gag tac ggc aaa aag ctc gag gaa ctg gcc gaa aaa atc tac cag ata	768
Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile	
245 250 255	
gca gga gag ccc ttc aac atc aat tct cca aaa cag gtt tca aag atc	816
Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile	
260 265 270	
ctt ttt gag aag ctg gga ata aaa ccc cgt gga aaa acg aca aaa aca	864
Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr	
275 280 285	
gga gcg tac tct acc agg ata gag gtg ttg gaa gag ata gcg aat gag	912
Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu	
290 295 300	
cac gag ata gta ccc ctc att ctc gag tac aga aag atc cag aaa ctg	960
His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu	
305 310 315 320	
aaa tcg acc tac ata gac acc ctt ccg aaa ctt gtg aac ccg aaa acc	1008
Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr	
325 330 335	
gga aga att cat gca tct ttc cac cag acg ggt acc gcc act ggc agg	1056
Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg	
340 345 350	
ttg agt agc agt gat cca aat ctt cag aat ctt ccg aca aag agc gaa	1104
Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu	
355 360 365	

gag gga aaa gaa att aga aaa gcg att gtg ccc cag gat cca gac tgg Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp 370 375 380	1152
tgg atc gtc agt gcg gat tat tcc caa ata gaa ctc aga atc ctc gct Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala 385 390 395 400	1200
cat ctc agt ggt gat gag aac ctt gtg aag gcc ttc gag gag ggc atc His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile 405 410 415	1248
gat gtg cac acc ttg act gcc tcc agg atc tac aac gta aag cca gaa Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu 420 425 430	1296
gaa gtg aac gaa gaa atg cga cgg gtt gga aag atg gtg aac ttc tct Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser 435 440 445	1344
ata ata tac ggt gtc aca ccg tac ggt ctt tct gtg aga ctt gga ata Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile 450 455 460	1392
ccg gtt aaa gaa gca gaa aag atg att atc agc tat ttc aca ctg tat Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr 465 470 475 480	1440
cca aag gtg cga agc tac atc cag cag gtt gtt gca gag gca aaa gag Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu 485 490 495	1488
aag ggc tac gtc agg act ctc ttt gga aga aaa aga gat att ccc cag Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln 500 505 510	1536
ctc atg gca agg gac aag aac acc cag tcc gaa ggc gaa aga atc gca Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala 515 520 525	1584
ata aac acc ccc att cag gga acg gcg gca gat ata ata aaa ttg gct Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala 530 535 540	1632
atg ata gat ata gac gag gag ctg aga aaa aga aac atg aaa tcc aga Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg 545 550 555 560	1680
atg atc att cag gtt cat gac gaa ctg gtc ttc gag gtt ccc gat gag Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu 565 570 575	1728
gaa aaa gaa gaa cta gtt gat ctg gtg aag aac aaa atg aca aat gtg Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val 580 585 590	1776

gtg aaa ctc tct gtg cct ctt gag gtt gac ata agc atc gga aaa agc 1824  
Val Lys Leu Ser Val Pro Leu Glu Val Asp Ile Ser Ile Gly Lys Ser  
595 600 605

tgg tct tga 1833  
Trp Ser  
610

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<212> PRT  
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Ile Val Lys Asp His Lys Thr Phe Glu Asp Leu Ile Glu Lys Leu Lys  
20 25 30

Glu Val Pro Ser Phe Ala Leu Asp Leu Asp Thr Ser Ser Leu Asp Pro  
35 40 45

Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr  
50 55 60

Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu  
65 70 75 80

Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser  
85 90 95

Lys Ile Val Gly Gln Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val  
100 105 110

Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala  
115 120 125

Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser  
130 135 140

Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser  
145 150 155 160

Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp  
165 170 175

Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu  
180 185 190

Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val  
195 200 205

Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu  
210 215 220

Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu  
225 230 235 240

Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile  
245 250 255

Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile  
260 265 270

Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr  
275 280 285

Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu  
290 295 300

His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu  
305 310 315 320

Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr  
325 330 335

Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg  
340 345 350

Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu  
355 360 365

Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp  
370 375 380

Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala  
385 390 395 400

His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile  
405 410 415



Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu  
420 425 430

Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser  
435 440 445

Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile  
450 455 460

Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr  
465 470 475 480

Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu  
485 490 495

Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln  
500 505 510

Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala  
515 520 525

Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala  
530 535 540

Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg  
545 550 555 560

Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu  
565 570 575

Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val  
580 585 590

Val Lys Leu Ser Val Pro Leu Glu Val Asp Ile Ser Ile Gly Lys Ser  
595 600 605

Trp Ser  
610

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<212> DNA  
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 taagtgatat ctgcatcctc gcaggagaag ttcgcagcc 39

<210> 21  
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<220>  
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<400> 21  
 acaaggctgc gaacttctcc tgcgaggatg cagatatca 39

<210> 22  
 <211> 1833  
 <212> DNA  
 <213> Artificial Sequence

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 Met Lys Glu Leu Gln Leu Tyr Glu Glu Ala Glu Pro Thr Gly Tyr Glu  
 1 5 10 15  
 atc gtg aag gat cat aag acc ttc gaa gat ctc atc gaa aag ctg aag 96  
 Ile Val Lys Asp His Lys Thr Phe Glu Asp Leu Ile Glu Lys Leu Lys  
 20 25 30  
 gag gtt cca tct ttt gcc ctg gac ctt gaa acg tcc tcc ctt gac ccg 144  
 Glu Val Pro Ser Phe Ala Leu Asp Leu Glu Thr Ser Ser Leu Asp Pro  
 35 40 45  
 ttc aac tgt gag ata gtc ggc atc tcc gtg tgc ttc aaa ccg aaa aca 192  
 Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr  
 50 55 60  
 gct tat tac att cca ctt cat cac aga aac gcc cag aat ctt gat gaa 240  
 Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu  
 65 70 75 80  
 aca ctg gtg ctg tgc aag ttg aaa gag atc ctc gaa gac ccg tct tgc 288  
 Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser  
 85 90 95  
 aag att gtg ggt cag aac ctg aag tac gac tac aag gtt ctt atg gta 336  
 Lys Ile Val Gly Gln Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val  
 100 105 110  
 aag ggt ata tgc cca gtt tat ccg cat ttt gac acg atg ata gct gca 384  
 Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala  
 115 120 125

tat ttg ctg gag cca aac gag aaa aaa ttc aat ctc gaa gat ctg tct Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser 130 135 140	432
ttg aaa ttt ctc gga tac aaa atg acg tct tat cag gaa ctg atg tcg Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser 145 150 155 160	480
ttt tcc tca cca ctt ttt ggt ttc agc ttt gcg gat gtt ccg gta gac Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp 165 170 175	528
aag gct gcg aac ttc tcc tgc gag gat gca gat atc act tat agg ctc Lys Ala Ala Asn Phe Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu 180 185 190	576
tac aag ata ctc agc atg aag ctc cat gaa gcg gaa ctt gag aac gtc Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val 195 200 205	624
ttc tac agg ata gag atg ccg ctt gtg aac gtt ctt gca cgc atg gaa Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu 210 215 220	672
ttg aac ggg gtg tat gtg gac aca gaa ttc ctg aaa aag ctc tcg gag Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu 225 230 235 240	720
gag tac ggc aaa aag ctc gag gaa ctg gcc gaa aaa atc tac cag ata Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile 245 250 255	768
gca gga gag ccc ttc aac atc aat tct cca aaa cag gtt tca aag atc Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile 260 265 270	816
ctt ttt gag aag ctg gga ata aaa ccc cgt gga aaa acg aca aaa aca Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr 275 280 285	864
gga gcg tac tct acc agg ata gag gtg ttg gaa gag ata gcg aat gag Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu 290 295 300	912
cac gag ata gta ccc ctc att ctc gag tac aga aag atc cag aaa ctg His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu 305 310 315 320	960
aaa tcg acc tac ata gac acc ctt ccg aaa ctt gtg aac ccg aaa acc Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr 325 330 335	1008
gga aga att cat gca tct ttc cac cag acg ggt acc gcc act ggc agg Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg 340 345 350	1056
ttg agt agc agt gat cca aat ctt cag aat ctt ccg aca aag agc gaa Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu 355 360 365	1104

gag gga aaa gaa att aga aaa gcg att gtg ccc cag gat cca gac tgg Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp 370 375 380	1152
tgg atc gtc agt gcg gat tat tcc caa ata gaa ctc aga atc ctc gct Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala 385 390 395 400	1200
cat ctc agt ggt gat gag aac ctt gtg aag gcc ttc gag gag ggc atc His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile 405 410 415	1248
gat gtg cac acc ttg act gcc tcc agg atc tac aac gta aag cca gaa Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu 420 425 430	1296
gaa gtg aac gaa gaa atg cga cgg gtt gga aag atg gtg aac ttc tct Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser 435 440 445	1344
ata ata tac ggt gtc aca ccg tac ggt ctt tct gtg aga ctt gga ata Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile 450 455 460	1392
ccg gtt aaa gaa gca gaa aag atg att atc agc tat ttc aca ctg tat Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr 465 470 475 480	1440
cca aag gtg cga agc tac atc cag cag gtt gtt gca gag gca aaa gag Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu 485 490 495	1488
aag ggc tac gtc agg act ctc ttt gga aga aaa aga gat att ccc cag Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln 500 505 510	1536
ctc atg gca agg gac aag aac acc cag tcc gaa ggc gaa aga atc gca Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala 515 520 525	1584
ata aac acc ccc att cag gga acg gcg gca gat ata ata aaa ttg gct Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala 530 535 540	1632
atg ata gat ata gac gag gag ctg aga aaa aga aac atg aaa tcc aga Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg 545 550 555 560	1680
atg atc att cag gtt cat gac gaa ctg gtc ttc gag gtt ccc gat gag Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu 565 570 575	1728
gaa aaa gaa gaa cta gtt gat ctg gtg aag aac aaa atg aca aat gtg Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val 580 585 590	1776

gtg aaa ctc tct gtg cct ctt gag gtt gac ata agc atc gga aaa agc 1824  
 Val Lys Leu Ser Val Pro Leu Glu Val Asp Ile Ser Ile Gly Lys Ser  
           595                          600                          605

tgg tct tga 1833  
 Trp Ser  
       610

<210> 23  
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 <212> PRT  
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Met Lys Glu Leu Gln Leu Tyr Glu Glu Ala Glu Pro Thr Gly Tyr Glu  
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Ile Val Lys Asp His Lys Thr Phe Glu Asp Leu Ile Glu Lys Leu Lys  
           20                          25                          30

Glu Val Pro Ser Phe Ala Leu Asp Leu Glu Thr Ser Ser Leu Asp Pro  
           35                          40                          45

Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr  
           50                          55                          60

Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu  
 65                          70                          75                          80

Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser  
           85                          90                          95

Lys Ile Val Gly Gln Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val  
           100                          105                          110

Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala  
           115                          120                          125

Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser  
           130                          135                          140

Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser  
 145                          150                          155                          160

Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp  
           165                          170                          175

Lys Ala Ala Asn Phe Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu  
 180 185 190

Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val  
 195 200 205

Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu  
 210 215 220

Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu  
 225 230 235 240

Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile  
 245 250 255

Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile  
 260 265 270

Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr  
 275 280 285

Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu  
 290 295 300

His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu  
 305 310 315 320

Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr  
 325 330 335

Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg  
 340 345 350

Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu  
 355 360 365

Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp  
 370 375 380

Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala  
 385 390 395 400

His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile  
 405 410 415

Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu  
 420 425 430

Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser  
 435 440 445

Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile  
 450 455 460

Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr  
 465 470 475 480

Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu  
 485 490 495

Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln  
 500 505 510

Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala  
 515 520 525

Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala  
 530 535 540

Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg  
 545 550 555 560

Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu  
 565 570 575

Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val  
 580 585 590

Val Lys Leu Ser Val Pro Leu Glu Val Asp Ile Ser Ile Gly Lys Ser  
 595 600 605

Trp Ser  
 610

<210> 24  
 <211> 32  
 <212> DNA  
 <213> Artificial Sequence

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32

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 Met Lys Glu Leu Gln Leu Tyr Glu Glu Ala Glu Pro Thr Gly Tyr Glu  
 1 5 10 15

atc gtg aag gat cat aag acc ttc gaa gat ctc atc gaa aag ctg aag 96  
 Ile Val Lys Asp His Lys Thr Phe Glu Asp Leu Ile Glu Lys Leu Lys  
 20 25 30

gag gtt cca tct ttt gcc ctg gac ctt gaa acg tcc tcc ctt gac ccg 144  
 Glu Val Pro Ser Phe Ala Leu Asp Leu Glu Thr Ser Ser Leu Asp Pro  
 35 40 45

ttc aac tgt gag ata gtc ggc atc tcc gtg tcg ttc aaa ccg aaa aca 192  
 Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr  
 50 55 60

gct tat tac att cca ctt cat cac aga aac gcc cag aat ctt gat gaa 240  
 Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu  
 65 70 75 80

aca ctg gtg ctg tcg aag ttg aaa gag atc ctc gaa gac ccg tct tcg 288  
 Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser  
 85 90 95

aag att gtg ggt cag aac ctg aag tac gac tac aag gtt ctt atg gta 336  
 Lys Ile Val Gly Gln Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val  
 100 105 110

aag ggt ata tcg cca gtt tat ccg cat ttt gac acg atg ata gct gca 384  
 Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala  
 115 120 125

tat ttg ctg gag cca aac gag aaa aaa ttc aat ctc gaa gat ctg tct 432  
 Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser  
 130 135 140

ttg aaa ttt ctc gga tac aaa atg acg tct tat cag gaa ctg atg tcg 480  
 Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser  
 145 150 155 160

ttt tcc tca cca ctt ttt ggt ttc agc ttt gcg gat gtt ccg gta gac 528  
 Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp  
 165 170 175

aag gct gcg aac tac tcc tgc gag aat gct gac atc act tat agg ctc 576  
 Lys Ala Ala Asn Tyr Ser Cys Glu Asn Ala Asp Ile Thr Tyr Arg Leu  
 180 185 190



tac aag ata ctc agc atg aag ctc cat gaa gcg gaa ctt gag aac gtc Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val 195 200 205	624
ttc tac agg ata gag atg ccg ctt gtg aac gtt ctt gca cgc atg gaa Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu 210 215 220	672
ttg aac ggg gtg tat gtg gac aca gaa ttc ctg aaa aag ctc tcg gag Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu 225 230 235 240	720
gag tac ggc aaa aag ctc gag gaa ctg gcc gaa aaa atc tac cag ata Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile 245 250 255	768
gca gga gag ccc ttc aac atc aat tct cca aaa cag gtt tca aag atc Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile 260 265 270	816
ctt ttt gag aag ctg gga ata aaa ccc cgt gga aaa acg aca aaa aca Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr 275 280 285	864
gga gcg tac tct acc agg ata gag gtg ttg gaa gag ata gcg aat gag Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu 290 295 300	912
cac gag ata gta ccc ctc att ctc gag tac aga aag atc cag aaa ctg His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu 305 310 315 320	960
aaa tcg acc tac ata gac acc ctt ccg aaa ctt gtg aac ccg aaa acc Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr 325 330 335	1008
gga aga att cat gca tct ttc cac cag acg ggt acc gcc act ggc agg Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg 340 345 350	1056
ttg agt agc agt gat cca aat ctt cag aat ctt ccg aca aag agc gaa Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu 355 360 365	1104
gag gga aaa gaa att aga aaa gcg att gtg ccc cag gat cca gac tgg Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp 370 375 380	1152
tgg atc gtc agt gcg gat tat tcc caa ata gaa ctc aga atc ctc gct Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala 385 390 395 400	1200
cat ctc agt ggt gat gag aac ctt gtg aag gcc ttc gag gag ggc atc His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile 405 410 415	1248
gat gtg cac acc ttg act gcc tcc agg atc tac aac gta aag cca gaa Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu 420 425 430	1296

gaa gtg aac gaa gaa atg cga cgg gtt gga aag atg gtg aac ttc tct Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser 435 440 445	1344
ata ata tac ggt gtc aca ccg tac ggt ctt tct gtg aga ctt gga ata Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile 450 455 460	1392
ccg gtt aaa gaa gca gaa aag atg att atc agc tat ttc aca ctg tat Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr 465 470 475 480	1440
cca aag gtg cga agc tac atc cag cag gtt gtt gca gag gca aaa gag Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu 485 490 495	1488
aag ggc tac gtc agg act ctc ttt gga aga aaa aga gat att ccc cag Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln 500 505 510	1536
ctc atg gca agg gac aag aac acc cag tcc gaa ggc gaa aga atc gca Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala 515 520 525	1584
ata aac acc ccc att cag gga acg gcg gca gat ata ata aaa ttg gct Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala 530 535 540	1632
atg ata gat ata gac gag gag ctg aga aaa aga aac atg aaa tcc aga Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg 545 550 555 560	1680
atg atc att cag gtt cat gac gaa ctg gtc ttc gag gtt ccc gat gag Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu 565 570 575	1728
gaa aaa gaa gaa cta gtt gat ctg gtg aag aac aaa atg aca aat gtg Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val 580 585 590	1776
gtg aaa ctc tct gtg cct ctt gag gtt gac ata agc atc gga aaa agc Val Lys Leu Ser Val Pro Leu Glu Val Asp Ile Ser Ile Gly Lys Ser 595 600 605	1824
tgg tct tga. Trp Ser 610	1833

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 <212> PRT  
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Ile Val Lys Asp His Lys Thr Phe Glu Asp Leu Ile Glu Lys Leu Lys  
20 25 30

Glu Val Pro Ser Phe Ala Leu Asp Leu Glu Thr Ser Ser Leu Asp Pro  
35 40 45

Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr  
50 55 60

Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu  
65 70 75 80

Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser  
85 90 95

Lys Ile Val Gly Gln Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val  
100 105 110

Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala  
115 120 125

Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser  
130 135 140

Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser  
145 150 155 160

Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp  
165 170 175

Lys Ala Ala Asn Tyr Ser Cys Glu Asn Ala Asp Ile Thr Tyr Arg Leu  
180 185 190

Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val  
195 200 205

Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu  
210 215 220

Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu  
225 230 235 240

Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile  
 245 250 255  
 Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile  
 260 265 270  
 Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr  
 275 280 285  
 Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu  
 290 295 300  
 His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu  
 305 310 315 320  
 Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr  
 325 330 335  
 Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg  
 340 345 350  
 Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu  
 355 360 365  
 Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp  
 370 375 380  
 Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala  
 385 390 395 400  
 His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile  
 405 410 415  
 Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu  
 420 425 430  
 Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser  
 435 440 445  
 Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile  
 450 455 460  
 Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr  
 465 470 475 480  
 Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu  
 485 490 495

Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln  
500 505 510

Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala  
515 520 525

Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala  
530 535 540

Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg  
545 550 555 560

Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu  
565 570 575

Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val  
580 585 590

Val Lys Leu Ser Val Pro Leu Glu Val Asp Ile Ser Ile Gly Lys Ser  
595 600 605

Trp Ser  
610

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21

<210> 28  
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1				5					10					15		
atc	gtg	aag	gat	cat	aag	acc	ttc	gaa	gat	ctc	atc	gaa	aag	ctg	aag	96
Ile	Val	Lys	Asp	His	Lys	Thr	Phe	Glu	Asp	Leu	Ile	Glu	Lys	Leu	Lys	
			20					25					30			
gag	gtt	cca	tct	ttt	gcc	ctg	gcc	ctt	gaa	acg	tcc	tcc	ctt	gac	ccg	144
Glu	Val	Pro	Ser	Phe	Ala	Leu	Ala	Leu	Glu	Thr	Ser	Ser	Leu	Asp	Pro	
		35					40					45				
ttc	aac	tgt	gag	ata	gtc	ggc	atc	tcc	gtg	tcg	ttc	aaa	ccg	aaa	aca	192
Phe	Asn	Cys	Glu	Ile	Val	Gly	Ile	Ser	Val	Ser	Phe	Lys	Pro	Lys	Thr	
	50					55					60					
gct	tat	tac	att	cca	ctt	cat	cac	aga	aac	gcc	cag	aat	ctt	gat	gaa	240
Ala	Tyr	Tyr	Ile	Pro	Leu	His	His	Arg	Asn	Ala	Gln	Asn	Leu	Asp	Glu	
65					70					75					80	
aca	ctg	gtg	ctg	tcg	aag	ttg	aaa	gag	atc	ctc	gaa	gac	ccg	tct	tcg	288
Thr	Leu	Val	Leu	Ser	Lys	Leu	Lys	Glu	Ile	Leu	Glu	Asp	Pro	Ser	Ser	
				85					90					95		
aag	att	gtg	ggg	cag	aac	ctg	aag	tac	gac	tac	aag	gtt	ctt	atg	gta	336
Lys	Ile	Val	Gly	Gln	Asn	Leu	Lys	Tyr	Asp	Tyr	Lys	Val	Leu	Met	Val	
			100					105					110			
aag	ggg	ata	tcg	cca	gtt	tat	ccg	cat	ttt	gac	acg	atg	ata	gct	gca	384
Lys	Gly	Ile	Ser	Pro	Val	Tyr	Pro	His	Phe	Asp	Thr	Met	Ile	Ala	Ala	
		115					120					125				
tat	ttg	ctg	gag	cca	aac	gag	aaa	aaa	ttc	aat	ctc	gaa	gat	ctg	tct	432
Tyr	Leu	Leu	Glu	Pro	Asn	Glu	Lys	Lys	Phe	Asn	Leu	Glu	Asp	Leu	Ser	
	130					135					140					
ttg	aaa	ttt	ctc	gga	tac	aaa	atg	acg	tct	tat	cag	gaa	ctg	atg	tcg	480
Leu	Lys	Phe	Leu	Gly	Tyr	Lys	Met	Thr	Ser	Tyr	Gln	Glu	Leu	Met	Ser	
145					150					155					160	
ttt	tcc	tca	cca	ctt	ttt	ggg	ttc	agc	ttt	gcg	gat	gtt	ccg	gta	gac	528
Phe	Ser	Ser	Pro	Leu	Phe	Gly	Phe	Ser	Phe	Ala	Asp	Val	Pro	Val	Asp	
				165					170					175		
aag	gct	gcg	aac	tac	tcc	tgc	gag	gat	gca	gac	atc	act	tat	agg	ctc	576
Lys	Ala	Ala	Asn	Tyr	Ser	Cys	Glu	Asp	Ala	Asp	Ile	Thr	Tyr	Arg	Leu	
			180					185					190			
tac	aag	ata	ctc	agc	atg	aag	ctc	cat	gaa	gcg	gaa	ctt	gag	aac	gtc	624
Tyr	Lys	Ile	Leu	Ser	Met	Lys	Leu	His	Glu	Ala	Glu					

ttg aac ggg gtg tat gtg gac aca gaa ttc ctg aaa aag ctc tcg gag Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu 225 230 235 240	720
gag tac ggc aaa aag ctc gag gaa ctg gcc gaa aaa atc tac cag ata Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile 245 250 255	768
gca gga gag ccc ttc aac atc aat tct cca aaa cag gtt tca aag atc Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile 260 265 270	816
ctt ttt gag aag ctg gga ata aaa ccc cgt gga aaa acg aca aaa aca Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr 275 280 285	864
gga gcg tac tct acc agg ata gag gtg ttg gaa gag ata gcg aat gag Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu 290 295 300	912
cac gag ata gta ccc ctc att ctc gag tac aga aag atc cag aaa ctg His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu 305 310 315 320	960
aaa tcg acc tac ata gac acc ctt ccg aaa ctt gtg aac ccg aaa acc Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr 325 330 335	1008
gga aga att cat gca tct ttc cac cag acg ggt acc gcc act ggc agg Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg 340 345 350	1056
ttg agt agc agt gat cca aat ctt cag aat ctt ccg aca aag agc gaa Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu 355 360 365	1104
gag gga aaa gaa att aga aaa gcg att gtg ccc cag gat cca gac tgg Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp 370 375 380	1152
tgg atc gtc agt gcg gat tat tcc caa ata gaa ctc aga atc ctc gct Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala 385 390 395 400	1200
cat ctc agt ggt gat gag aac ctt gtg aag gcc ttc gag gag ggc atc His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile 405 410 415	1248
gat gtg cac acc ttg act gcc tcc agg atc tac aac gta aag cca gaa Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu 420 425 430	1296
gaa gtg aac gaa gaa atg cga cgg gtt gga aag atg gtg aac ttc tct Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser 435 440 445	1344
ata ata tac ggt gtc aca ccg tac ggt ctt tct gtg aga ctt gga ata Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile 450 455 460	1392

ccg gtt aaa gaa gca gaa aag atg att atc agc tat ttc aca ctg tat	1440
Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr	
465 470 475 480	
cca aag gtg cga agc tac atc cag cag gtt gtt gca gag gca aaa gag	1488
Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu	
485 490 495	
aag ggc tac gtc agg act ctc ttt gga aga aaa aga gat att ccc cag	1536
Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln	
500 505 510	
ctc atg gca agg gac aag aac acc cag tcc gaa ggc gaa aga atc gca	1584
Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala	
515 520 525	
ata aac acc ccc att cag gga acg gcg gca gat ata ata aaa ttg gct	1632
Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala	
530 535 540	
atg ata gat ata gac gag gag ctg aga aaa aga aac atg aaa tcc aga	1680
Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg	
545 550 555 560	
atg atc att cag gtt cat gac gaa ctg gtc ttc gag gtt ccc gat gag	1728
Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu	
565 570 575	
gaa aaa gaa gaa cta gtt gat ctg gtg aag aac aaa atg aca aat gtg	1776
Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val	
580 585 590	
gtg aaa ctc tct gtg cct ctt gag gtt gac ata agc atc gga aaa agc	1824
Val Lys Leu Ser Val Pro Leu Glu Val Asp Ile Ser Ile Gly Lys Ser	
595 600 605	
tgg tct tga	1833
Trp Ser	
610	

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Ile Val Lys Asp His Lys Thr Phe Glu Asp Leu Ile Glu Lys Leu Lys
20 25 30

Glu Val Pro Ser Phe Ala Leu Ala Leu Glu Thr Ser Ser Leu Asp Pro
35 40 45



Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr  
50 55 60  
Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu  
65 70 75 80  
Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser  
85 90 95  
Lys Ile Val Gly Gln Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val  
100 105 110  
Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala  
115 120 125  
Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser  
130 135 140  
Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser  
145 150 155 160  
Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp  
165 170 175  
Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu  
180 185 190  
Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val  
195 200 205  
Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu  
210 215 220  
Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu  
225 230 235 240  
Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile  
245 250 255  
Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile  
260 265 270  
Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr  
275 280 285  
Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu  
290 295 300

His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu  
 305 310 315 320

Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr  
 325 330 335

Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg  
 340 345 350

Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu  
 355 360 365

Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp  
 370 375 380

Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala  
 385 390 395 400

His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile  
 405 410 415

Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu  
 420 425 430

Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser  
 435 440 445

Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile  
 450 455 460

Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr  
 465 470 475 480

Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu  
 485 490 495

Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln  
 500 505 510

Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala  
 515 520 525

Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala  
 530 535 540

Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg  
 545 550 555 560

Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu  
 565 570 575

Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val  
 580 585 590

Val Lys Leu Ser Val Pro Leu Glu Val Asp Ile Ser Ile Gly Lys Ser  
 595 600 605

Trp Ser  
 610

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<400> 30  
 cctgaagtac gcgtacaagg ttcttatgg

29

<210> 31  
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 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Synthetic

<400> 31  
 tcacacagga aacagctatg ac

22

<210> 32  
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atc gtg aag gat cat aag acc ttc gaa gat ctc atc gaa aag ctg aag		96
Ile Val Lys Asp His Lys Thr Phe Glu Asp Leu Ile Glu Lys Leu Lys		
20 25 30		
gag gtt cca tct ttt gcc ctg gac ctt gaa acg tcc tcc ctt gac ccg		144
Glu Val Pro Ser Phe Ala Leu Asp Leu Glu Thr Ser Ser Leu Asp Pro		
35 40 45		
ttc aac tgt gag ata gtc ggc atc tcc gtg tcg ttc aaa ccg aaa aca		192
Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr		
50 55 60		
gct tat tac att cca ctt cat cac aga aac gcc cag aat ctt gat gaa		240
Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu		
65 70 75 80		
aca ctg gtg ctg tcg aag ttg aaa gag atc ctc gaa gac ccg tct tcg		288
Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser		
85 90 95		
aag att gtg ggt cag aac ctg aag tac gcg tac aag gtt ctt atg gta		336
Lys Ile Val Gly Gln Asn Leu Lys Tyr Ala Tyr Lys Val Leu Met Val		
100 105 110		
aag ggt ata tcg cca gtt tat ccg cat ttt gac acg atg ata gct gca		384
Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala		
115 120 125		
tat ttg ctg gag cca aac gag aaa aaa ttc aat ctc gaa gat ctg tct		432
Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser		
130 135 140		
ttg aaa ttt ctc gga tac aaa atg acg tct tat cag gaa ctg atg tcg		480
Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser		
145 150 155 160		
ttt tcc tca cca ctt ttt ggt ttc agc ttt gcg gat gtt ccg gta gac		528
Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp		
165 170 175		
aag gct gcg aac tac tcc tgc gag gat gca gac atc act tat agg ctc		576
Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu		
180 185 190		
tac aag ata ctc agc atg aag ctc cat gaa gcg gaa ctt gag aac gtc		624
Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val		
195 200 205		
ttc tac agg ata gag atg ccg ctt gtg aac gtt ctt gca cgc atg gaa		672
Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu		
210 215 220		
ttg aac ggg gtg tat gtg gac aca gaa ttc ctg aaa aag ctc tcg gag		720
Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu		
225 230 235 240		

gag tac ggc aaa aag ctc gag gaa ctg gcc gaa aaa atc tac cag ata Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile 245 250 255	768
gca gga gag ccc ttc aac atc aat tct cca aaa cag gtt tca aag atc Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile 260 265 270	816
ctt ttt gag aag ctg gga ata aaa ccc cgt gga aaa acg aca aaa aca Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr 275 280 285	864
gga gcg tac tct acc agg ata gag gtg ttg gaa gag ata gcg aat gag Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu 290 295 300	912
cac gag ata gta ccc ctc att ctc gag tac aga aag atc cag aaa ctg His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu 305 310 315 320	960
aaa tcg acc tac ata gac acc ctt ccg aaa ctt gtg aac ccg aaa acc Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr 325 330 335	1008
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ttg agt agc agt gat cca aat ctt cag aat ctt ccg aca aag agc gaa Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu 355 360 365	1104
gag gga aaa gaa att aga aaa gcg att gtg ccc cag gat cca gac tgg Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp 370 375 380	1152
tgg atc gtc agt gcg gat tat tcc caa ata gaa ctc aga atc ctc gct Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala 385 390 395 400	1200
cat ctc agt ggt gat gag aac ctt gtg aag gcc ttc gag gag ggc atc His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile 405 410 415	1248
gat gtg cac acc ttg act gcc tcc agg atc tac aac gta aag cca gaa Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu 420 425 430	1296
gaa gtg aac gaa gaa atg cga cgg gtt gga aag atg gtg aac ttc tct Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser 435 440 445	1344
ata ata tac ggt gtc aca ccg tac ggt ctt tct gtg aga ctt gga ata Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile 450 455 460	1392

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Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr	
465 470 475 480	
cca aag gtg cga agc tac atc cag cag gtt gtt gca gag gca aaa gag	1488
Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu	
485 490 495	
aag ggc tac gtc agg act ctc ttt gga aga aaa aga gat att ccc cag	1536
Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln	
500 505 510	
ctc atg gca agg gac aag aac acc cag tcc gaa ggc gaa aga atc gca	1584
Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala	
515 520 525	
ata aac acc ccc att cag gga acg gcg gca gat ata ata aaa ttg gct	1632
Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala	
530 535 540	
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Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg	
545 550 555 560	
atg atc att cag gtt cat gac gaa ctg gtc ttc gag gtt ccc gat gag	1728
Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu	
565 570 575	
gaa aaa gaa gaa cta gtt gat ctg gtg aag aac aaa atg aca aat gtg	1776
Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val	
580 585 590	
gtg aaa ctc tct gtg cct ctt gag gtt gac ata agc atc gga aaa agc	1824
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tgg tct tga	1833
Trp Ser	
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35 40 45

Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr  
50 55 60  
Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu  
65 70 75 80  
Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser  
85 90 95  
Lys Ile Val Gly Gln Asn Leu Lys Tyr Ala Tyr Lys Val Leu Met Val  
100 105 110  
Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala  
115 120 125  
Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser  
130 135 140  
Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser  
145 150 155 160  
Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp  
165 170 175  
Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu  
180 185 190  
Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val  
195 200 205  
Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu  
210 215 220  
Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu  
225 230 235 240  
Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile  
245 250 255  
Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile  
260 265 270  
Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr  
275 280 285  
Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu  
290 295 300

His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu  
 305 310 315 320

Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr  
 325 330 335

Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg  
 340 345 350

Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu  
 355 360 365

Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp  
 370 375 380

Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala  
 385 390 395 400

His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile  
 405 410 415

Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu  
 420 425 430

Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser  
 435 440 445

Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile  
 450 455 460

Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr  
 465 470 475 480

Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu  
 485 490 495

Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln  
 500 505 510

Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala  
 515 520 525

Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala  
 530 535 540



Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg  
545 550 555 560

Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu  
565 570 575

Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val  
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595 600 605

Trp Ser  
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Ile Val Lys Asp His Lys Thr Phe Glu Asp Leu Ile Glu Lys Leu Lys	
20 25 30	
gag gtt cca tct ttt gcc ctg gcc ctt gaa acg tcc tcc ctt gac ccg	144
Glu Val Pro Ser Phe Ala Leu Ala Leu Glu Thr Ser Ser Leu Asp Pro	
35 40 45	
ttc aac tgt gag ata gtc ggc atc tcc gtg tcg ttc aaa ccg aaa aca	192
Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr	
50 55 60	
gct tat tac att cca ctt cat cac aga aac gcc cag aat ctt gat gaa	240
Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu	
65 70 75 80	
aca ctg gtg ctg tcg aag ttg aaa gag atc ctc gaa gac ccg tct tcg	288
Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser	
85 90 95	
aag att gtg ggt cag aac ctg aag tac gcg tac aag gtt ctt atg gta	336
Lys Ile Val Gly Gln Asn Leu Lys Tyr Ala Tyr Lys Val Leu Met Val	
100 105 110	

aag ggt ata tcg cca gtt tat ccg cat ttt gac acg atg ata gct gca Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala 115 120 125	384
tat ttg ctg gag cca aac gag aaa aaa ttc aat ctc gaa gat ctg tct Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser 130 135 140	432
ttg aaa ttt ctc gga tac aaa atg acg tct tat cag gaa ctg atg tcg Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser 145 150 155 160	480
ttt tcc tca cca ctt ttt ggt ttc agc ttt gcg gat gtt ccg gta gac Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp 165 170 175	528
aag gct gcg aac tac tcc tgc gag gat gca gac atc act tat agg ctc Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu 180 185 190	576
tac aag ata ctc agc atg aag ctc cat gaa gcg gaa ctt gag aac gtc Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val 195 200 205	624
ttc tac agg ata gag atg ccg ctt gtg aac gtt ctt gca cgc atg gaa Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu 210 215 220	672
ttg aac ggg gtg tat gtg gac aca gaa ttc ctg aaa aag ctc tcg gag Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu 225 230 235 240	720
gag tac ggc aaa aag ctc gag gaa ctg gcc gaa aaa atc tac cag ata Glu Tyr Gly Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile 245 250 255	768
gca gga gag ccc ttc aac atc aat tct cca aaa cag gtt tca aag atc Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile 260 265 270	816
ctt ttt gag aag ctg gga ata aaa ccc cgt gga aaa acg aca aaa aca Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr 275 280 285	864
gga gcg tac tct acc agg ata gag gtg ttg gaa gag ata gcg aat gag Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu 290 295 300	912
cac gag ata gta ccc ctc att ctc gag tac aga aag atc cag aaa ctg His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu 305 310 315 320	960
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cat ctc agt ggt gat gag aac ctt gtg aag gcc ttc gag gag ggc atc His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile 405 410 415	1248
gat gtg cac acc ttg act gcc tcc agg atc tac aac gta aag cca gaa Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu 420 425 430	1296
gaa gtg aac gaa gaa atg cga cgg gtt gga aag atg gtg aac ttc tct Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser 435 440 445	1344
ata ata tac ggt gtc aca ccg tac ggt ctt tct gtg aga ctt gga ata Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile 450 455 460	1392
ccg gtt aaa gaa gca gaa aag atg att atc agc tat ttc aca ctg tat Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr 465 470 475 480	1440
cca aag gtg cga agc tac atc cag cag gtt gtt gca gag gca aaa gag Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu 485 490 495	1488
aag ggc tac gtc agg act ctc ttt gga aga aaa aga gat att ccc cag Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln 500 505 510	1536
ctc atg gca agg gac aag aac acc cag tcc gaa ggc gaa aga atc gca Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala 515 520 525	1584
ata aac acc ccc att cag gga acg gcg gca gat ata ata aaa ttg gct Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala 530 535 540	1632
atg ata gat ata gac gag gag ctg aga aaa aga aac atg aaa tcc aga Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg 545 550 555 560	1680
atg atc att cag gtt cat gac gaa ctg gtc ttc gag gtt ccc gat gag Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu 565 570 575	1728
gaa aaa gaa gaa cta gtt gat ctg gtg aag aac aaa atg aca aat gtg Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val 580 585 590	1776

gtg aaa ctc tct gtg cct ctt gag gtt gac ata agc atc gga aaa agc 1824  
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595 600 605

tgg tct tga 1833  
Trp Ser  
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Glu Val Pro Ser Phe Ala Leu Ala Leu Glu Thr Ser Ser Leu Asp Pro  
35 40 45

Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr  
50 55 60

Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu  
65 70 75 80

Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser  
85 90 95

Lys Ile Val Gly Gln Asn Leu Lys Tyr Ala Tyr Lys Val Leu Met Val  
100 105 110

Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala  
115 120 125

Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser  
130 135 140

Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser  
145 150 155 160

Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp  
165 170 175

Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu  
180 185 190

Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val  
195 200 205

Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu  
210 215 220

Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu  
225 230 235 240

Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile  
245 250 255

Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile  
260 265 270

Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr  
275 280 285

Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu  
290 295 300

His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu  
305 310 315 320

Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr  
325 330 335

Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg  
340 345 350

Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu  
355 360 365

Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp  
370 375 380

Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala  
385 390 395 400

His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile  
405 410 415

Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu  
420 425 430

Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser  
435 440 445

Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile  
450 455 460

Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr  
465 470 475 480

Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu  
485 490 495

Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln  
500 505 510

Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala  
515 520 525

Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala  
530 535 540

Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg  
545 550 555 560

Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu  
565 570 575

Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val  
580 585 590

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595 600 605

Trp Ser  
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ctc gag tac aga aag atc cag aaa ctg aaa tcg acc tac ata gac acc Leu Glu Tyr Arg Lys Ile Gln Lys Leu Lys Ser Thr Tyr Ile Asp Thr 275 280 285	864
ctt ccg aaa ctt gtg aac ccg aaa acc gga aga att cat gca tct ttc Leu Pro Lys Leu Val Asn Pro Lys Thr Gly Arg Ile His Ala Ser Phe 290 295 300	912
cac cag acg ggt acc gcc act ggc agg ttg agt agc agt gat cca aat His Gln Thr Gly Thr Ala Thr Gly Arg Leu Ser Ser Ser Asp Pro Asn 305 310 315 320	960
ctt cag aat ctt ccg aca aag agc gaa gag gga aaa gaa att aga aaa Leu Gln Asn Leu Pro Thr Lys Ser Glu Glu Gly Lys Glu Ile Arg Lys 325 330 335	1008
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tcc caa ata gaa ctc aga atc ctc gct cat ctc agt ggt gat gag aac Ser Gln Ile Glu Leu Arg Ile Leu Ala His Leu Ser Gly Asp Glu Asn 355 360 365	1104
ctt gtg aag gcc ttc gag gag ggc atc gat gtg cac acc ttg act gcc Leu Val Lys Ala Phe Glu Glu Gly Ile Asp Val His Thr Leu Thr Ala 370 375 380	1152
tcc agg atc tac aac gta aag cca gaa gaa gtg aac gaa gaa atg cga Ser Arg Ile Tyr Asn Val Lys Pro Glu Glu Val Asn Glu Glu Met Arg 385 390 395 400	1200
cgg gtt gga aag atg gtg aac ttc tct ata ata tac ggt gtc aca ccg Arg Val Gly Lys Met Val Asn Phe Ser Ile Ile Tyr Gly Val Thr Pro 405 410 415	1248
tac ggt ctt tct gtg aga ctt gga ata ccg gtt aaa gaa gca gaa aag Tyr Gly Leu Ser Val Arg Leu Gly Ile Pro Val Lys Glu Ala Glu Lys 420 425 430	1296
atg att atc agc tat ttc aca ctg tat cca aag gtg cga agc tac atc Met Ile Ile Ser Tyr Phe Thr Leu Tyr Pro Lys Val Arg Ser Tyr Ile 435 440 445	1344
cag cag gtt gtt gca gag gca aaa gag aag ggc tac gtc agg act ctc Gln Gln Val Val Ala Glu Ala Lys Glu Lys Gly Tyr Val Arg Thr Leu 450 455 460	1392
ttt gga aga aaa aga gat att ccc cag ctc atg gca agg gac aag aac Phe Gly Arg Lys Arg Asp Ile Pro Gln Leu Met Ala Arg Asp Lys Asn 465 470 475 480	1440



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Thr Gln Ser Glu Gly Glu Arg Ile Ala Ile Asn Thr Pro Ile Gln Gly	
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Leu Val Lys Asn Lys Met Thr Asn Val Val Lys Leu Ser Val Pro Leu	
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Ile Ser Val Ser Phe Lys Pro Lys Thr Ala Tyr Tyr Ile Pro Leu His
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His Arg Asn Ala Gln Asn Leu Asp Glu Thr Leu Val Leu Ser Lys Leu
35 40 45

Lys Glu Ile Leu Glu Asp Pro Ser Ser Lys Ile Val Gly Gln Asn Leu
50 55 60

Lys Tyr Asp Tyr Lys Val Leu Met Val Lys Gly Ile Ser Pro Val Tyr
65 70 75 80

Pro His Phe Asp Thr Met Ile Ala Ala Tyr Leu Leu Glu Pro Asn Glu
85 90 95

Lys Lys Phe Asn Leu Glu Asp Leu Ser Leu Lys Phe Leu Gly Tyr Lys
100 105 110

Met Thr Ser Tyr Gln Glu Leu Met Ser Phe Ser Ser Pro Leu Phe Gly  
 115 120 125

Phe Ser Phe Ala Asp Val Pro Val Asp Lys Ala Ala Asn Tyr Ser Cys  
 130 135 140

Glu Asp Ala Asp Ile Thr Tyr Arg Leu Tyr Lys Ile Leu Ser Met Lys  
 145 150 155 160

Leu His Glu Ala Glu Leu Glu Asn Val Phe Tyr Arg Ile Glu Met Pro  
 165 170 175

Leu Val Asn Val Leu Ala Arg Met Glu Leu Asn Gly Val Tyr Val Asp  
 180 185 190

Thr Glu Phe Leu Lys Lys Leu Ser Glu Glu Tyr Gly Lys Lys Leu Glu  
 195 200 205

Glu Leu Ala Glu Lys Ile Tyr Gln Ile Ala Gly Glu Pro Phe Asn Ile  
 210 215 220

Asn Ser Pro Lys Gln Val Ser Lys Ile Leu Phe Glu Lys Leu Gly Ile  
 225 230 235 240

Lys Pro Arg Gly Lys Thr Thr Lys Thr Gly Ala Tyr Ser Thr Arg Ile  
 245 250 255

Glu Val Leu Glu Glu Ile Ala Asn Glu His Glu Ile Val Pro Leu Ile  
 260 265 270

Leu Glu Tyr Arg Lys Ile Gln Lys Leu Lys Ser Thr Tyr Ile Asp Thr  
 275 280 285

Leu Pro Lys Leu Val Asn Pro Lys Thr Gly Arg Ile His Ala Ser Phe  
 290 295 300

His Gln Thr Gly Thr Ala Thr Gly Arg Leu Ser Ser Ser Asp Pro Asn  
 305 310 315 320

Leu Gln Asn Leu Pro Thr Lys Ser Glu Glu Gly Lys Glu Ile Arg Lys  
 325 330 335

Ala Ile Val Pro Gln Asp Pro Asp Trp Trp Ile Val Ser Ala Asp Tyr  
 340 345 350

Ser Gln Ile Glu Leu Arg Ile Leu Ala His Leu Ser Gly Asp Glu Asn  
 355 360 365

Leu Val Lys Ala Phe Glu Glu Gly Ile Asp Val His Thr Leu Thr Ala  
 370 375 380

Ser Arg Ile Tyr Asn Val Lys Pro Glu Glu Val Asn Glu Glu Met Arg  
 385 390 395 400

Arg Val Gly Lys Met Val Asn Phe Ser Ile Ile Tyr Gly Val Thr Pro  
 405 410 415

Tyr Gly Leu Ser Val Arg Leu Gly Ile Pro Val Lys Glu Ala Glu Lys  
 420 425 430

Met Ile Ile Ser Tyr Phe Thr Leu Tyr Pro Lys Val Arg Ser Tyr Ile  
 435 440 445

Gln Gln Val Val Ala Glu Ala Lys Glu Lys Gly Tyr Val Arg Thr Leu  
 450 455 460

Phe Gly Arg Lys Arg Asp Ile Pro Gln Leu Met Ala Arg Asp Lys Asn  
 465 470 475 480

Thr Gln Ser Glu Gly Glu Arg Ile Ala Ile Asn Thr Pro Ile Gln Gly  
 485 490 495

Thr Ala Ala Asp Ile Ile Lys Leu Ala Met Ile Asp Ile Asp Glu Glu  
 500 505 510

Leu Arg Lys Arg Asn Met Lys Ser Arg Met Ile Ile Gln Val His Asp  
 515 520 525

Glu Leu Val Phe Glu Val Pro Asp Glu Glu Lys Glu Glu Leu Val Asp  
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Leu Val Lys Asn Lys Met Thr Asn Val Val Lys Leu Ser Val Pro Leu  
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Glu Val Asp Ile Ser Ile Gly Lys Ser Trp Ser  
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Met Lys Glu Leu Gln Leu Tyr Glu Glu Ala Glu Pro Thr Gly Tyr Glu
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atc gtg aag gat cat aag acc ttc gaa gat ctg tct ttg aaa ttt ctc      96
Ile Val Lys Asp His Lys Thr Phe Glu Asp Leu Ser Leu Lys Phe Leu
                               20          25          30

gga tac aaa atg acg tct tat cag gaa ctg atg tcg ttt tcc tca cca      144
Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser Phe Ser Ser Pro
                               35          40          45

ctt ttt ggt ttc agc ttt gcg gat gtt ccg gta gac aag gct gcg aac      192
Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp Lys Ala Ala Asn
                               50          55          60

tac tcc tgc gag gat gca gac atc act tat agg ctc tac aag ata ctc      240
Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu Tyr Lys Ile Leu
65                               70          75          80

agc atg aag ctc cat gaa gcg gaa ctt gag aac gtc ttc tac agg ata      288
Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val Phe Tyr Arg Ile
                               85          90          95

gag atg ccg ctt gtg aac gtt ctt gca cgc atg gaa ttg aac ggg gtg      336
Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu Leu Asn Gly Val
                               100          105          110

tat gtg gac aca gaa ttc ctg aaa aag ctc tcg gag gag tac ggc aaa      384
Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu Glu Tyr Gly Lys
                               115          120          125

aag ctc gag gaa ctg gcc gaa aaa atc tac cag ata gca gga gag ccc      432
Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile Ala Gly Glu Pro
                               130          135          140

ttc aac atc aat tct cca aaa cag gtt tca aag atc ctt ttt gag aag      480
Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile Leu Phe Glu Lys
145          150          155          160

ctg gga ata aaa ccc cgt gga aaa acg aca aaa aca gga gcg tac tct      528
Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr Gly Ala Tyr Ser
                               165          170          175

acc agg ata gag gtg ttg gaa gag ata gcg aat gag cac gag ata gta      576
Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu His Glu Ile Val
                               180          185          190

ccc ctc att ctc gag tac aga aag atc cag aaa ctg aaa tcg acc tac      624
Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu Lys Ser Thr Tyr
                               195          200          205

ata gac acc ctt ccg aaa ctt gtg aac ccg aaa acc gga aga att cat      672
Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr Gly Arg Ile His
210          215          220

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gca tct ttc cac cag acg ggt acc gcc act ggc agg ttg agt agc agt Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg Leu Ser Ser Ser 225 230 235 240	720
gat cca aat ctt cag aat ctt ccg aca aag agc gaa gag gga aaa gaa Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu Glu Gly Lys Glu 245 250 255	768
att aga aaa gcg att gtg ccc cag gat cca gac tgg tgg atc gtc agt Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp Trp Ile Val Ser 260 265 270	816
gcg gat tat tcc caa ata gaa ctc aga atc ctc gct cat ctc agt ggt Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala His Leu Ser Gly 275 280 285	864
gat gag aac ctt gtg aag gcc ttc gag gag ggc atc gat gtg cac acc Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile Asp Val His Thr 290 295 300	912
ttg act gcc tcc agg atc tac aac gta aag cca gaa gaa gtg aac gaa Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu Glu Val Asn Glu 305 310 315 320	960
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gtc aca ccg tac ggt ctt tct gtg aga ctt gga ata ccg gtt aaa gaa Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile Pro Val Lys Glu 340 345 350	1056
gca gaa aag atg att atc agc tat ttc aca ctg tat cca aag gtg cga Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr Pro Lys Val Arg 355 360 365	1104
agc tac atc cag cag gtt gtt gca gag gca aaa gag aag ggc tac gtc Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu Lys Gly Tyr Val 370 375 380	1152
agg act ctc ttt gga aga aaa aga gat att ccc cag ctc atg gca agg Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln Leu Met Ala Arg 385 390 395 400	1200
gac aag aac acc cag tcc gaa ggc gaa aga atc gca ata aac acc ccc Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala Ile Asn Thr Pro 405 410 415	1248
att cag gga acg gcg gca gat ata ata aaa ttg gct atg ata gat ata Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala Met Ile Asp Ile 420 425 430	1296
gac gag gag ctg aga aaa aga aac atg aaa tcc aga atg atc att cag Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg Met Ile Ile Gln 435 440 445	1344
gtt cat gac gaa ctg gtc ttc gag gtt ccc gat gag gaa aaa gaa gaa Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu Glu Lys Glu Glu 450 455 460	1392

cta gtt gat ctg gtg aag aac aaa atg aca aat gtg gtg aaa ctc tct 1440  
 Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val Val Lys Leu Ser  
 465 470 475 480

gtg cct ctt gag gtt gac ata agc atc gga aaa agc tgg tct tga 1485  
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Ile Val Lys Asp His Lys Thr Phe Glu Asp Leu Ser Leu Lys Phe Leu  
 20 25 30

Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser Phe Ser Ser Pro  
 35 40 45

Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp Lys Ala Ala Asn  
 50 55 60

Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu Tyr Lys Ile Leu  
 65 70 75 80

Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val Phe Tyr Arg Ile  
 85 90 95

Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu Leu Asn Gly Val  
 100 105 110

Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu Glu Tyr Gly Lys  
 115 120 125

Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile Ala Gly Glu Pro  
 130 135 140

Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile Leu Phe Glu Lys  
 145 150 155 160

Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr Gly Ala Tyr Ser  
 165 170 175

Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu His Glu Ile Val  
180 185 190

Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu Lys Ser Thr Tyr  
195 200 205

Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr Gly Arg Ile His  
210 215 220

Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg Leu Ser Ser Ser  
225 230 235 240

Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu Glu Gly Lys Glu  
245 250 255

Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp Trp Ile Val Ser  
260 265 270

Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala His Leu Ser Gly  
275 280 285

Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile Asp Val His Thr  
290 295 300

Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu Glu Val Asn Glu  
305 310 315 320

Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser Ile Ile Tyr Gly  
325 330 335

Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile Pro Val Lys Glu  
340 345 350

Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr Pro Lys Val Arg  
355 360 365

Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu Lys Gly Tyr Val  
370 375 380

Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln Leu Met Ala Arg  
385 390 395 400

Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala Ile Asn Thr Pro  
405 410 415

Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala Met Ile Asp Ile  
420 425 430

Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg Met Ile Ile Gln  
 435 440 445

Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu Glu Lys Glu Glu  
 450 455 460

Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val Val Lys Leu Ser  
 465 470 475 480

Val Pro Leu Glu Val Asp Ile Ser Ile Gly Lys Ser Trp Ser  
 485 490

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 agtgagtcgt atta

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74

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<400> 43 gaatcgtcgt atgcagtga aactc	25
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<210> 45 <211> 33 <212> DNA <213> Artificial Sequence	
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Tyr

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Gly

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<212> PRT  
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<400> 54

Arg Val Ile Tyr Met Pro Phe Asp Asn Glu Arg Asp Met Leu Met Glu  
1 5 10 15

Tyr Ile

<210> 55  
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Met Ile Val Ser Asp Ile Glu Ala Asn Ala Leu Leu Glu Ser Val  
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<210> 56  
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<400> 56

Lys Ala Pro Val Phe Ala Phe Asp Thr Glu Thr Asp Ser Leu Asp Asn  
1 5 10 15

Ile Ser

<210> 57

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<212> PRT

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<400> 57

Glu Ser Pro Ser Phe Ala Ile Asp Leu Glu Thr Ser Ser Leu Asp Pro  
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Phe Asp

<210> 58

<211> 18

<212> PRT

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<220>

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<400> 58

Glu Val Pro Ser Phe Ala Leu Asp Leu Glu Thr Ser Ser Leu Asp Pro  
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Phe Asn

<210> 59

<211> 14

<212> PRT

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<400> 59

Leu Val Ala His Asn Ala Ser Phe Asp Met Gly Phe Leu Asn  
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<400> 61

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<400> 63

Val Gly Gln Asn Leu Lys Tyr Asp Arg Gly Ile Leu Ala  
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Val Gly Gln Asn Leu Lys Phe Asp Tyr Lys Val Leu Met  
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<400> 66

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Ala Leu Cys Ala Arg Tyr Glu Ile Asp Asn Ser Lys Arg  
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<400> 68

Asp Lys Ile Arg Gly Phe Ile Asp Leu Val Leu Ser  
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Glu Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr  
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<210> 72  
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Asp Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr  
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<210> 73  
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<400> 73

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Tyr Leu Tyr Arg Ala Tyr His Ala Phe Pro Pro Leu Thr Asn Ser Ala  
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Gly Glu Pro Thr Gly Ala Met Tyr Gly Val Leu Asn Met Leu Arg Ser  
 35 40 45

Leu Ile Met Gln Tyr Lys Pro Thr His Ala Ala Val Val Phe Asp Ala  
 50 55 60

Lys Gly Lys Thr Phe Arg Asp Glu Leu Phe Glu His Tyr Lys Ser His  
 65 70 75 80

Arg Pro Pro Met Pro Asp Asp Leu Arg Ala Gln Ile Glu Pro Leu His  
 85 90 95

Ala Met Val Lys Ala Met Gly Leu Pro Leu Leu Ala Val Ser Gly Val  
 100 105 110

Glu Ala Asp Asp Val Ile Gly Thr Leu Ala Arg Glu Ala Glu Lys Ala  
 115 120 125

Gly Arg Pro Val Leu Ile Ser Thr Gly Asp Lys Asp Met Ala Gln Leu  
 130 135 140

Val Thr Pro Asn Ile Thr Leu Ile Asn Thr Met Thr Asn Thr Ile Leu  
 145 150 155 160



Gly Pro Glu Glu Val Val Asn Lys Tyr Gly Val Pro Pro Glu Leu Ile  
 165 170 175

Ile Asp Phe Leu Ala Leu Met Gly Asp Ser Ser Asp Asn Ile Pro Gly  
 180 185 190

Val Pro Gly Val Gly Glu Lys Thr Ala Gln Ala Leu Leu Gln Gly Leu  
 195 200 205

Gly Gly Leu Asp Thr Leu Tyr Ala Glu Pro Glu Lys Ile Ala Gly Leu  
 210 215 220

Ser Phe Arg Gly Ala Lys Thr Met Ala Ala Lys Leu Glu Gln Asn Lys  
 225 230 235 240

Glu Val Ala Tyr Leu Ser Tyr Gln Leu Ala Thr Ile Lys Thr Asp Val  
 245 250 255

Glu Leu Glu Leu Thr Cys Glu Gln Leu Glu Val Gln Gln Pro Ala Ala  
 260 265 270

Glu Glu Leu Leu Gly Leu Phe Lys Lys Tyr Glu Phe Lys Arg Trp Thr  
 275 280 285

Ala Asp Val Glu Ala Gly Lys Trp Leu Gln Ala Lys Gly Ala Lys Pro  
 290 295 300

Ala Ala Lys Pro Gln Glu Thr Ser Val Ala Asp Glu Ala Pro Glu Val  
 305 310 315 320

Thr Ala Thr Val Ile Ser Tyr Asp Asn Tyr Val Thr Ile Leu Asp Glu  
 325 330 335

Glu Thr Leu Lys Ala Trp Ile Ala Lys Leu Glu Lys Ala Pro Val Phe  
 340 345 350

Ala Phe Asp Thr Glu Thr Asp Ser Leu Asp Asn Ile Ser Ala Asn Leu  
 355 360 365

Val Gly Leu Ser Phe Ala Ile Glu Pro Gly Val Ala Ala Tyr Ile Pro  
 370 375 380

Val Ala His Asp Tyr Leu Asp Ala Pro Asp Gln Ile Ser Arg Glu Arg  
 385 390 395 400

Ala Leu Glu Leu Leu Lys Pro Leu Leu Glu Asp Glu Lys Ala Leu Lys  
 405 410 415

Val Gly Gln Asn Leu Lys Tyr Asp Arg Gly Ile Leu Ala Asn Tyr Gly  
420 425 430

Ile Glu Leu Arg Gly Ile Ala Phe Asp Thr Met Leu Glu Ser Tyr Ile  
435 440 445

Leu Asn Ser Val Ala Gly Arg His Asp Met Asp Ser Leu Ala Glu Arg  
450 455 460

Trp Leu Lys His Lys Thr Ile Thr Phe Glu Glu Ile Ala Gly Lys Gly  
465 470 475 480

Lys Asn Gln Leu Thr Phe Asn Gln Ile Ala Leu Glu Glu Ala Gly Arg  
485 490 495

Tyr Ala Ala Glu Asp Ala Asp Val Thr Leu Gln Leu His Leu Lys Met  
500 505 510

Trp Pro Asp Leu Gln Lys His Lys Gly Pro Leu Asn Val Phe Glu Asn  
515 520 525

Ile Glu Met Pro Leu Val Pro Val Leu Ser Arg Ile Glu Arg Asn Gly  
530 535 540

Val Lys Ile Asp Pro Lys Val Leu His Asn His Ser Glu Glu Leu Thr  
545 550 555 560

Leu Arg Leu Ala Glu Leu Glu Lys Lys Ala His Glu Ile Ala Gly Glu  
565 570 575

Glu Phe Asn Leu Ser Ser Thr Lys Gln Leu Gln Thr Ile Leu Phe Glu  
580 585 590

Lys Gln Gly Ile Lys Pro Leu Lys Lys Thr Pro Gly Gly Ala Pro Ser  
595 600 605

Thr Ser Glu Glu Val Leu Glu Glu Leu Ala Leu Asp Tyr Pro Leu Pro  
610 615 620

Lys Val Ile Leu Glu Tyr Arg Gly Leu Ala Lys Leu Lys Ser Thr Tyr  
625 630 635 640

Thr Asp Lys Leu Pro Leu Met Ile Asn Pro Lys Thr Gly Arg Val His  
 645 650 655  
 Thr Ser Tyr His Gln Ala Val Thr Ala Thr Gly Arg Leu Ser Ser Thr  
 660 665 670  
 Asp Pro Asn Leu Gln Asn Ile Pro Val Arg Asn Glu Glu Gly Arg Arg  
 675 680 685  
 Ile Arg Gln Ala Phe Ile Ala Pro Glu Asp Tyr Val Ile Val Ser Ala  
 690 695 700  
 Asp Tyr Ser Gln Ile Glu Leu Arg Ile Met Ala His Leu Ser Arg Asp  
 705 710 715 720  
 Lys Gly Leu Leu Thr Ala Phe Ala Glu Gly Lys Asp Ile His Arg Ala  
 725 730 735  
 Thr Ala Ala Glu Val Phe Gly Leu Pro Leu Glu Thr Val Thr Ser Glu  
 740 745 750  
 Gln Arg Arg Ser Ala Lys Ala Ile Asn Phe Gly Leu Ile Tyr Gly Met  
 755 760 765  
 Ser Ala Phe Gly Leu Ala Arg Gln Leu Asn Ile Pro Arg Lys Glu Ala  
 770 775 780  
 Gln Lys Tyr Met Asp Leu Tyr Phe Glu Arg Tyr Pro Gly Val Leu Glu  
 785 790 795 800  
 Tyr Met Glu Arg Thr Arg Ala Gln Ala Lys Glu Gln Gly Tyr Val Glu  
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 Thr Leu Asp Gly Arg Arg Leu Tyr Leu Pro Asp Ile Lys Ser Ser Asn  
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 Gly Ala Arg Arg Ala Ala Ala Glu Arg Ala Ala Ile Asn Ala Pro Met  
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 Gln Gly Thr Ala Ala Asp Ile Ile Lys Arg Ala Met Ile Ala Val Asp  
 850 855 860  
 Ala Trp Leu Gln Ala Glu Gln Pro Arg Val Arg Met Ile Met Gln Val  
 865 870 875 880  
 His Asp Glu Leu Val Phe Glu Val His Lys Asp Asp Val Asp Ala Val  
 885 890 895

Ala Lys Gln Ile His Gln Leu Met Glu Asn Cys Thr Arg Leu Asp Val  
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<400> 74

Met Ala Arg Leu Phe Leu Phe Asp Gly Thr Ala Leu Ala Tyr Arg Ala  
 1 5 10 15

Tyr Tyr Ala Leu Asp Arg Ser Leu Ser Thr Ser Thr Gly Ile Pro Thr  
 20 25 30

Asn Ala Thr Tyr Gly Val Ala Arg Met Leu Val Arg Phe Ile Lys Asp  
 35 40 45

His Ile Ile Val Gly Lys Asp Tyr Val Ala Val Ala Phe Asp Lys Lys  
 50 55 60

Ala Ala Thr Phe Arg His Lys Leu Leu Glu Thr Tyr Lys Ala Gln Arg  
 65 70 75 80

Pro Lys Thr Pro Asp Leu Leu Ile Gln Gln Leu Pro Tyr Ile Lys Lys  
 85 90 95

Leu Val Glu Ala Leu Gly Met Lys Val Leu Glu Val Glu Gly Tyr Glu  
 100 105 110

Ala Asp Asp Ile Ile Ala Thr Leu Ala Val Lys Gly Leu Pro Leu Phe  
 115 120 125

Asp Glu Ile Phe Ile Val Thr Gly Asp Lys Asp Met Leu Gln Leu Val  
 130 135 140

Asn Glu Lys Ile Lys Val Trp Arg Ile Val Lys Gly Ile Ser Asp Leu  
 145 150 155 160

Glu Leu Tyr Asp Ala Gln Lys Val Lys Glu Lys Tyr Gly Val Glu Pro  
 165 170 175

Gln Gln Ile Pro Asp Leu Leu Ala Leu Thr Gly Asp Glu Ile Asp Asn  
 180 185 190

Ile Pro Gly Val Thr Gly Ile Gly Glu Lys Thr Ala Val Gln Leu Leu  
195 200 205

Glu Lys Tyr Lys Asp Leu Glu Asp Ile Leu Asn His Val Arg Glu Leu  
210 215 220

Pro Gln Lys Val Arg Lys Ala Leu Leu Arg Asp Arg Glu Asn Ala Ile  
225 230 235 240

Leu Ser Lys Lys Leu Ala Ile Leu Glu Thr Asn Val Pro Ile Glu Ile  
245 250 255

Asn Trp Glu Glu Leu Arg Tyr Gln Gly Tyr Asp Arg Glu Lys Leu Leu  
260 265 270

Pro Leu Leu Lys Glu Leu Glu Phe Ala Ser Ile Met Lys Glu Leu Gln  
275 280 285

Leu Tyr Glu Glu Ser Glu Pro Val Gly Tyr Arg Ile Val Lys Asp Leu  
290 295 300

Val Glu Phe Glu Lys Leu Ile Glu Lys Leu Arg Glu Ser Pro Ser Phe  
305 310 315 320

Ala Ile Asp Leu Glu Thr Ser Ser Leu Asp Pro Phe Asp Cys Asp Ile  
325 330 335

Val Gly Ile Ser Val Ser Phe Lys Pro Lys Glu Ala Tyr Tyr Ile Pro  
340 345 350

Leu His His Arg Asn Ala Gln Asn Leu Asp Glu Lys Glu Val Leu Lys  
355 360 365

Lys Leu Lys Glu Ile Leu Glu Asp Pro Gly Ala Lys Ile Val Gly Gln  
370 375 380

Asn Leu Lys Phe Asp Tyr Lys Val Leu Met Val Lys Gly Val Glu Pro  
385 390 395 400

Val Pro Pro Tyr Phe Asp Thr Met Ile Ala Ala Tyr Leu Leu Glu Pro  
405 410 415

Asn Glu Lys Lys Phe Asn Leu Asp Asp Leu Ala Leu Lys Phe Leu Gly  
420 425 430

Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser Phe Ser Phe Pro Leu  
435 440 445

Phe Gly Phe Ser Phe Ala Asp Val Pro Val Glu Lys Ala Ala Asn Tyr  
450 455 460

Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu Tyr Lys Thr Leu Ser  
465 470 475 480

Leu Lys Leu His Glu Ala Asp Leu Glu Asn Val Phe Tyr Lys Ile Glu  
485 490 495

Met Pro Leu Val Asn Val Leu Ala Arg Met Glu Leu Asn Gly Val Tyr  
500 505 510

Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu Glu Tyr Gly Lys Lys  
515 520 525

Leu Glu Glu Leu Ala Glu Glu Ile Tyr Arg Ile Ala Gly Glu Pro Phe  
530 535 540

Asn Ile Asn Ser Pro Lys Gln Val Ser Arg Ile Leu Phe Glu Lys Leu  
545 550 555 560

Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr Gly Asp Tyr Ser Thr  
565 570 575

Arg Ile Glu Val Leu Glu Glu Leu Ala Gly Glu His Glu Ile Ile Pro  
580 585 590

Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu Lys Ser Thr Tyr Ile  
595 600 605

Asp Ala Leu Pro Lys Met Val Asn Pro Lys Thr Gly Arg Ile His Ala  
610 615 620

Ser Phe Asn Gln Thr Gly Thr Ala Thr Gly Arg Leu Ser Ser Ser Asp  
625 630 635 640

Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu Glu Gly Lys Glu Ile  
645 650 655

Arg Lys Ala Ile Val Pro Gln Asp Pro Asn Trp Trp Ile Val Ser Ala  
660 665 670

Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala His Leu Ser Gly Asp  
675 680 685

Glu Asn Leu Leu Arg Ala Phe Glu Glu Gly Ile Asp Val His Thr Leu  
690 695 700

Thr Ala Ser Arg Ile Phe Asn Val Lys Pro Glu Glu Val Thr Glu Glu  
705 710 715 720

Met Arg Arg Ala Gly Lys Met Val Asn Phe Ser Ile Ile Tyr Gly Val  
725 730 735

Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Val Pro Val Lys Glu Ala  
740 745 750

Glu Lys Met Ile Val Asn Tyr Phe Val Leu Tyr Pro Lys Val Arg Asp  
755 760 765

Tyr Ile Gln Arg Val Val Ser Glu Ala Lys Glu Lys Gly Tyr Val Arg  
770 775 780

Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln Leu Met Ala Arg Asp  
785 790 795 800

Arg Asn Thr Gln Ala Glu Gly Glu Arg Ile Ala Ile Asn Thr Pro Ile  
805 810 815

Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala Met Ile Glu Ile Asp  
820 825 830

Arg Glu Leu Lys Glu Arg Lys Met Arg Ser Lys Met Ile Ile Gln Val  
835 840 845

His Asp Glu Leu Val Phe Glu Val Pro Asn Glu Glu Lys Asp Ala Leu  
850 855 860

Val Glu Leu Val Lys Asp Arg Met Thr Asn Val Val Lys Leu Ser Val  
865 870 875 880

Pro Leu Glu Val Asp Val Thr Ile Gly Lys Thr Trp Ser  
885 890

<210> 75  
 <211> 893  
 <212> PRT  
 <213> Thermotoga neapolitana

<400> 75

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Met Ala Arg Leu Phe Leu Phe Asp Gly Thr Ala Leu Ala Tyr Arg Ala
1          5          10          15

Tyr Tyr Ala Leu Asp Arg Ser Leu Ser Thr Ser Thr Gly Ile Pro Thr
          20          25          30

Asn Ala Val Tyr Gly Val Ala Arg Met Leu Val Lys Phe Ile Lys Glu
          35          40          45

His Ile Ile Pro Glu Lys Asp Tyr Ala Ala Val Ala Phe Asp Lys Lys
50          55          60

Ala Ala Thr Phe Arg His Lys Leu Leu Glu Ala Tyr Lys Ala Gln Arg
65          70          75          80

Pro Lys Thr Pro Asp Leu Leu Val Gln Gln Leu Pro Tyr Ile Lys Arg
          85          90          95

Leu Ile Glu Ala Leu Gly Phe Lys Val Leu Glu Leu Glu Gly Tyr Glu
          100          105          110

Ala Asp Asp Ile Ile Ala Thr Leu Ala Val Lys Gly Cys Thr Phe Phe
          115          120          125

Asp Glu Ile Phe Ile Ile Thr Gly Asp Lys Asp Met Leu Gln Leu Val
          130          135          140

Asn Glu Lys Ile Lys Val Trp Arg Ile Val Lys Gly Ile Ser Asp Leu
145          150          155          160

Glu Leu Tyr Asp Ser Lys Lys Val Lys Glu Arg Tyr Gly Val Glu Pro
          165          170          175

His Gln Ile Pro Asp Leu Leu Ala Leu Thr Gly Asp Glu Ile Asp Asn
          180          185          190

Ile Pro Gly Val Thr Gly Ile Gly Glu Lys Thr Ala Val Gln Leu Leu
          195          200          205

Gly Lys Tyr Arg Asn Leu Glu Asp Ile Leu Glu His Ala Arg Glu Leu
210          215          220

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Pro Gln Arg Val Arg Lys Ala Leu Leu Arg Asp Arg Glu Val Ala Ile  
 225 230 235 240  
 Leu Ser Lys Lys Leu Ala Thr Leu Val Thr Asn Ala Pro Val Glu Val  
 245 250 255  
 Asp Trp Glu Glu Met Lys Tyr Arg Gly Tyr Asp Lys Arg Lys Leu Leu  
 260 265 270  
 Pro Ile Leu Lys Glu Leu Glu Phe Ala Ser Ile Met Lys Glu Leu Gln  
 275 280 285  
 Leu Tyr Glu Glu Ala Glu Pro Thr Gly Tyr Glu Ile Val Lys Asp His  
 290 295 300  
 Lys Thr Phe Glu Asp Leu Ile Glu Lys Leu Lys Glu Val Pro Ser Phe  
 305 310 315 320  
 Ala Leu Asp Leu Glu Thr Ser Ser Leu Asp Pro Phe Asn Cys Glu Ile  
 325 330 335  
 Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr Ala Tyr Tyr Ile Pro  
 340 345 350  
 Leu His His Arg Asn Ala Gln Asn Leu Asp Glu Thr Leu Val Leu Ser  
 355 360 365  
 Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser Lys Ile Val Gly Gln  
 370 375 380  
 Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val Lys Gly Ile Ser Pro  
 385 390 395 400  
 Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala Tyr Leu Leu Glu Pro  
 405 410 415  
 Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser Leu Lys Phe Leu Gly  
 420 425 430  
 Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser Phe Ser Ser Pro Leu  
 435 440 445  
 Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp Lys Ala Ala Asn Tyr  
 450 455 460  
 Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu Tyr Lys Ile Leu Ser  
 465 470 475 480

Met Lys Leu His Glu Ala Glu Leu Glu Asn Val Phe Tyr Arg Ile Glu  
 485 490 495

Met Pro Leu Val Asn Val Leu Ala Arg Met Glu Leu Asn Gly Val Tyr  
 500 505 510

Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu Glu Tyr Gly Lys Lys  
 515 520 525

Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile Ala Gly Glu Pro Phe  
 530 535 540

Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile Leu Phe Glu Lys Leu  
 545 550 555 560

Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr Gly Ala Tyr Ser Thr  
 565 570 575

Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu His Glu Ile Val Pro  
 580 585 590

Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu Lys Ser Thr Tyr Ile  
 595 600 605

Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr Gly Arg Ile His Ala  
 610 615 620

Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg Leu Ser Ser Ser Asp  
 625 630 635 640

Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu Glu Gly Lys Glu Ile  
 645 650 655

Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp Trp Ile Val Ser Ala  
 660 665 670

Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala His Leu Ser Gly Asp<sup>o</sup>  
 675 680 685

Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile Asp Val His Thr Leu  
 690 695 700

Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu Glu Val Asn Glu Glu  
705 710 715 720

Met Arg Arg Val Gly Lys Met Val Asn Phe Ser Ile Ile Tyr Gly Val  
725 730 735

Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile Pro Val Lys Glu Ala  
740 745 750

Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr Pro Lys Val Arg Ser  
755 760 765

Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu Lys Gly Tyr Val Arg  
770 775 780

Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln Leu Met Ala Arg Asp  
785 790 795 800

Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala Ile Asn Thr Pro Ile  
805 810 815

Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala Met Ile Asp Ile Asp  
820 825 830

Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg Met Ile Ile Gln Val  
835 840 845

His Asp Glu Leu Val Phe Glu Val Pro Asp Glu Glu Lys Glu Glu Leu  
850 855 860

Val Asp Leu Val Lys Asn Lys Met Thr Asn Val Val Lys Leu Ser Val  
865 870 875 880

Pro Leu Glu Val Asp Ile Ser Ile Gly Lys Ser Trp Ser  
885 890